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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/555,447
Filing Date: November 03, 2005
Appellant(s): FUJINO ET AL.

Nathaniel McQueen
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed May 30, 2008 appealing from the Office action mailed October 25, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(**8) Evidence Relied Upon**

6287720	YAMASHITA	9-2001
6576366	FUJIWARA	6-2003
2005/0014063	SHI	1-2005

2001/0004502	NAKAMIZO	6-2001
6200706	ASHIDA	3-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1, 2, and 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6287720 (Yamashita et al.) in view of US 6,576,366 (Fujiwara et al.).

As to claim 1 Yamashita et al. teach a nonaqueous secondary battery with a nonaqueous electrolyte with a positive electrode comprising cathode active material, a negative electrode comprising anode active material, and a separator disposed between the positive and negative electrodes, operatively with the electrolyte (col. 5, lines 8-23). Furthermore, Yamashita et al. exemplify a lithium ion secondary battery with a cathode active material made of a composite of a lithium oxide (col. 11, lines 7-10). An anode active material inherently has the property of absorbing and desorbing lithium. Example 6 has a separator [13B] made of polyethylene (col. 30, lines 63-66). Additionally, example 6 has a second layer of the separator that acts as a porous film [13A] made of insulating substance (filler) α-Al_2O_3 and binder polyvinylidene fluoride (PVDF), where the porous film [13A] is directly formed on the cathode active material layer [11b] (col. 29, lines 51-58; col. 30, lines 5-8).

Yamashita et al. does not teach that the separator comprises a non-woven fabric.

However, Fujiwara et al. teaches a non-aqueous electrolyte secondary cell (title). In the teaching, materials of separators are disclosed including olefin polymers, such as polyethylene (as used by Yamashita et al. in example 6), and non-woven cloth (col. 9, lines 27-38). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the non-woven cloth taught by Fujiwara et al. for the

separator of Yamashita et al.'s battery, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

As to claims 2 and 5, Yamashita et al. teaches a separator [13A, 13B] with a thickness between 100 nm to 100 μm.

Yamashita et al. does not mention the thicknesses of each individual section of the separator: 15 μm to 50 μm for the non-woven fabric [13B] and 0.5 μm to 20 μm [13A] for the porous film layer (as applied to claims 2 and 5, respectively). The combined range of these two sections yields between 15.5 μm to 70 μm.

It would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to make Yamashita et al.'s separator with the ranges specified by claims 2 and 5, as it has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a <u>prima facie</u> rejection is properly established when the difference in the range or value is minor. <u>Titanium Metals Corp. of Am. v. Banner</u>, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985). Additionally, claims that differ from the prior art only by slightly different (non-overlapping) ranges are prima facie obvious without a showing that the claimed range achieves unexpected results relative to the prior art. (In re Woodruff, 16 USPQ2d 1935,1937 (Fed. Cir. 1990))

As to claim 6, Yamashita et al. teaches different binders. Examples include PVDF (as used in previously cited example 6) and acrylonitrile-butadiene (copolymer latex) (col. 7, lines 59-65).

As to claim 7, the weight ratio of α-Al_2O_3 to PVDF is 100/5. Therefore, the weight percentage is:

$$\frac{wt\_alu\min a}{total\_wt} = \frac{100}{100+5} * 100\% = 95.2\%$$

As to claim 8, Yamashita et al. teaches that Figs. 7(a) to (c) show with all of the structural attributes of their battery and can additionally be spirally wound to form a spirally wound unit cell (col. 16, lines 41-48).

2. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita et al. and Fujiwara et al., as applied to claim 1, in further view of US 2005/0014064 (Shi et al.).

As to claim 3, the combination of Yamashita et al. and Fujiwara et al. do not teach a non-woven fabric with a melt-down temperature of 150°C or more.

Shi et al. teaches a high melt integrity battery separator for lithium ion batteries (title). The separators are made of nonwoven flat sheets, wherein high temperature melt integrity means that the separator will sustain dimensional stability until a temperature of at least 200°C (abstract; para 0011). The motivation for providing nonwoven flat sheet separators with this characteristic is in order to better maintain dimensional stability within a battery. Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to use the materials of Shi et al. (nonwoven flat sheets) in order to improve dimensional stability of the separator at higher temperatures.

As to claim 4, the combination of Yamashita et al. and Fujiwara et al. do not teach the specific type of non-woven fabric used.

Shi et al. teaches nonwoven flat sheets, which are fibers that are held together, used for separators; specific fibers are polyamides and polyimides (para 0013). It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the nonwoven flat sheets of Shi et al. as the separator for the battery taught by Fujiwara et al., since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

(10) Response to Argument

Issue 1(a) – Appellant argues that PE (polyethylene) and non-woven cloth are not equivalents in the art for separator material.

Examiner respectfully disagrees. Yamashita et al. teaches known materials used for separators include olefin polymers, such as polyethylene and non-woven cloth (col. 9, lines 27-38). Furthermore, Appellant's own Admitted Prior Art (Background) states that both polyolefin microporous films and non-woven cloths have been used as separators (para 0003-0006). Examiner is unsure how two recognized separator materials are not art recognized equivalents for separator materials and why one of ordinary skill in the art would not have found it obvious to use either as a separator material. Therefore, replacing a microporous film with a non-woven cloth (one separator material for another), accordingly, would have been obvious to one of ordinary skill, since it has been held to be within the general skill of a worker in the art to

select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin,* 125 USPQ 416.

Issue 1(b) – Appellant argues that the combination of a porous film and a non-woven cloth separator exhibits unexpected and superior results over a battery having a porous film alone or a porous film in combination with PE. It is noted that Appellant specifically points to (I) comparative example 4 (PE microporous film with a porous film), example 5 (polypropylene non-woven fabric with a porous film), and example 24 (polypropylene-polyamide nonwoven fabric with a porous film), pointing to how Examples 5 and 24 they have a significantly higher discharge capacity, capacity retention, and better nail safety data than Comparative Example 4 and (II) Comparative Example 2 (microporous film and no porous film), comparing it to Comparative Example 4, stating that the porous film leads to inferior charging characteristics with a microporous film, whereas Examples 5 and 24 show that the combination of a porous film with a non-woven fabric yields superior characteristics.

Examiner respectfully disagrees.

With respect to (I), Examiner submits that no unexpected/significant difference has been shown.

Regarding discharge capacity: Comparing the discharge capacity at 400 mA, comparative example 4 has a discharge capacity of 2008 mAh, whereas as examples 5 and 24 have discharge capacities of 2012 and 2011 mAh, respectively. This difference - merely 3 or 4 out of thousands of mAh - is not seen be significant. Additionally the

discharge capacity at 4000 mA is not seen as significant either. Comparative example 4 has a discharge capacity 1789 mAh, while examples 5 and 24 have discharge capacities of 1821 and 1889 mAh, respectively. The greatest difference cited is 100 mAh (between example 24 and comparative example 4) out about 2000, wherein the difference is small compared to the fact that the scale is close to that of 2000 mAh. Additionally, it is noted that the design capacities of examples 5 (2015 mAh) and 24 (2015 mAh) are higher than that of comparative example 4 (2010 mAh), so one would expect the charge/discharge characteristics to yield higher numbers, as it is designed to be able to have higher capacities. Therefore, the comparisons of example 5, example 24, and comparative example 4 are not equal, as not all variables are the same at the time of the test. Such a comparison would be similar to comparing the discharge capacity of comparative example 4 to example 15, which has a design capacity of 1380, and drawing conclusions from it, wherein the design of the battery, besides what Appellant claims provides unexpected results, is different. Additionally, Examiner relies upon other examples in table 2 (not specifically cited by Appellant) to confirm the position that the differences in capacity is not significant and fails to show unexpected results. Some examples that embody Appellant's claimed application have *lower* charge/discharge capacities than that of comparative example 4, even when the design capacity is higher. Examiner points to examples 16 and 17; example 16 has a design capacity of 2017 mAh, a discharge capacity of 1822 mAh at 400 mA and a discharge capacity of 1472 mAh at 4000 mA. This is either proof that (a) the discharge capacitates between example 5, example 24, and comparative example 4 are not

significantly different (as examples 16 and 17 and examples 5 and 24 embody a range that encompasses the results obtained by comparative example 4) or (b) that the results of the claimed invention are not necessarily superior to that of the prior art. Either way, Appellant's data fails to show unexpected results.

Regarding the capacity retention rate (%) after 300 cycles: Comparing comparative example 4 yields a retention rate of 88, while example 5 yields a retention rate of 95, and example 24 yields a retention rate of 93. However, the difference between a few percentages is not seen as significant. Appellant's table 2 shows such a trend. The highest retention rate is 95 (as displayed in examples 4 and 5), while the lowest retention rate is 91 (as displayed in examples 15 and 22). The difference in this is 4. The difference between comparative example 4 (88) and that of a retention rate obtained by the instant application as displayed in examples 15 and 22 (91) is 3. Therefore, it is seen that the difference between an embodied example and a comparative example is not terribly significant. Furthermore, by noting examples 5 and 24, Appellant is only comparing the examples with the best characteristics, which does not appropriately represent the full scope of the claims. Furthermore, Examiner would like to note the fact that a non-woven cloth separator yielding higher capacity retention is not unexpected. Appellant's own background (admitted prior art) cites the fact that microporous film separators (i.e. that used in comparative example 4) has low porosity and thus has a low ability to retain electrolyte, especially after repeated charges and discharges, and thus capacity tends to be lower due to electrolyte depletion (para 0004). Appellant's admitted prior art further goes on to state that non-woven fabric

retains electrolyte better than microporous film separators (para 0005). (Better electrolyte retention, as achieved by non-woven fabric) would result in higher capacity, as para 0004 of Appellant's admitted prior art states low electrolyte retention/electrolyte depletion, a characteristic of microporous films, results in lower capacity.) In addition to Appellant's admitted prior art, Examiner would like to introduce US 2001/0004502 (Nakamizo et al.) as an evidentiary piece further emphasize that the portion relied upon in Appellant's admitted prior art was known to one of ordinary skill in the art. Nakamizo et al. shows that it was known that microporous films (polyolefin resins as embodied by both the instant application and that of the prior art of Yamashita et al.) is known to have a low-electrolyte retaining characteristic due to only being able to hold electrolyte in the vacant holes (low porosity) and that non-woven fabrics improve the electrolyte retaining nature (para 0006-0008). Therefore Nakamizo et al. shows that low electrolyte retention (corresponding to a low capacity) was a known problem within microporous films and that high electrolyte retention (corresponding to a high capacity), much like Appellant's admitted prior art. Therefore, Examiner is unsure how showing that a microporous separator has lower capacity retention is unexpected in light of the teaching in the admitted prior art and as evidenced by Nakamizo et al.

Regarding the nail penetration safety: Comparing examples 5 and 24 to comparative example 4 shows that the temperatures obtained by the tests are different. However, this is not a showing of unexpected, superior results. The data points given for example 5 are 74, 94, 72, and 89 °C. The data points given example 24 is 65, 93, 72, and 95 °C. The data points given for comparative example 4 are 80, 149, 77, and

91 °C. The temperatures for the first, third, and forth points are relatively similar (with comparative example 4 testing better at the fourth point – nail speed of 180 mm/s after 90s). However, Appellant fails to represent the full scope of the claims with the above comparison. For example, example 2 has nail penetration safety data wherein the first three data points are similar to that of comparative example 4 and the fourth point (at a speed of 180 mm/s after 90 s) is much worse: 78, 139, 77, and 136 °C. With this example present, Examiner is unsure how Appellant's claimed invention truly is shown to have superior results. Additionally, Examiner would like to note that the comparisons of comparative example 4 and the examples are not commensurate in scope. It is shown that the examples use a separator *material* (not just separator type (non-woven cloth/microporous film)). In table 1, it can be seen that PP (polypropylene) non-woven cloth is embodied in most of the examples with one example using a PP-PA (polypropylene-polyamide) non-woven fabric. The separator of comparative example 4 is PE (polyethylene). Therefore, the materials being compared are different, and different materials have different characteristics (i.e. it is seen that the meltdown temperature of PE is lower than that of the tested PP and PP-PA). Therefore, the examples fail to show that it is really the material type (non-woven cloth/microporous film) and not the material itself (PP or PP-PA vs. PE) that provides these differences, as there is no example showing the use of a PE non-woven cloth separator.

With respect to (II), Examiner respectfully disagrees with Appellant's submissions.

Regarding the comparison of comparative example 2 and comparative example 4: Examiner respectfully disagrees that a separator made with a combination of a porous film with a microporous layer (comparative example 4) leads to inferior qualities than that of a microporous layer alone. For example, the design capacity of comparative example 2 is higher than that of comparative example 4 (2015 mAh vs. 2010 mAh). However, the comparative example 4 yields a slightly higher charge/discharge capacity at 400 mA (2008 vs. 2003 mAh). Although at 4000 mA, comparative example 2 is higher (1888 mAh) than that of comparative example 4 (1789 mAh), the difference cited is less than 100 mAh out about 2000 mAh, wherein the difference is small compared to the fact that the scale is close to that of 2,000 mAh. It is noted that the capacity retention rate is nearly the same, too (90 for comparative example 2 and 88 for comparative example 4). Examiner submits that such differences in example 2 and 4 are not significant with respect to the capacity. Additionally, Examiner submits that Appellant has ignored part of the results. Nail penetration safety was much greater for that of comparative example 4 (with the porous sheet). The temperatures read at 1s for each of the nail speeds of comparative example 2 is much higher than that of comparative example 4 (see table 2). It is noted that no data was available for either nail speed at 90s. Along the lines of the examination of the data above, Examiner is unsure how comparative example 2 yields better characteristics overall than that of comparative example 4. Examiner would like particularly point out that the inclusion of a porous layer to a non-woven cloth yields similar trends as that of adding a porous film to a microporous film, and accordingly it is incorrect to conclude

that the combination of porous film and yields inferior charging characteristics when the combination of a porous film with a non-woven cloth separator yields the same trends. Such analysis is provided herein. Looking at comparative example 1 (non-woven cloth separator) and comparative example 19 (non-woven cloth separator with porous layer), the data can be compared. The only difference is the addition of the porous layer. The design capacities are the same (2017 mAh). However, the charge/discharge characteristics of comparative example 1 are better than that of example 1 (in the same sense that comparative example 2 is better than comparative example 4, wherein the only difference is the inclusion of a porous film in comparative example 4). Comparative example 1 has a discharge capacity 2012 mAh, while example 19 has a discharge capacity of 2015 mAh (nearly the same on a scale of over 2000 mAh) at 400 mA. However at 4000 mA, comparative example 1 yields a discharge capacity of 1971 mAh, while example 20 yields a discharge capacity of 1983 mAh. It is also noted that the capacity retention of comparative example 1 is higher than that of example 19 (95 vs. 94). Therefore, the inclusion of a porous layer in a battery with a non-woven cloth actually yields relationships with respect to capacity similar to that of the inclusion of a porous layer in a battery with a microporous film separator (i.e. having a porous layer in both a non-woven fabric separator as well as a microporous film separator has a higher discharge capacity at 400 mA, a lower capacity at 4000 mA, and a lower capacity retention rate when compared to its counterpart having no porous layer; please see table 2, comparative example 1 and example 19 and comparative example 2 and comparative example 4). Therefore, Examiner submits that that Appellant's judgment

that the combination of PE film and porous film results in an inferior charging characteristics is misguided, as the inclusion of the porous layer yields the same capacity trends when added that of a non-woven cloth separator.

Regarding the statement that that the combination of a non-woven fabric and a porous film (example 5 and example 24) provides superior characteristics in all areas over batteries having no porous film, or a porous film combined with PE: Examiner respectfully disagrees. The comparison between comparative example 4 and examples 5 and 24 have already been drawn in the response denoted under section (I), as seen above. For the reasons stated in section (I), Examiner submits that no unexpected and superior characteristics have been clearly shown. Examiner would like to submit that the prior art relied upon includes a porous layer, and thus comparative example 2 is not an appropriate comparison to make to show unexpected results with respect to Appellant's claimed invention and the prior art. Accordingly, Examiner submits (for the reasons set forth above in Issue 1(b)), that Appellant's fails to clearly set fort that their invention displays unexpected, superior characteristics.

Finally, Examiner would like to note that Appellant has not shown unexpected results as is deemed by the scope of the claimed invention. The separator is a "non-woven fabric" and the porous film is an "inorganic oxide filler with a binder." However, only two types of non-woven clothes are tested (PP and PP-PA). Appellant fails to test other cloths (such as polyamide alone, polyimide, polyethylene terephthalate (as indicated in claim 4), or other known separator materials such as polyethylene (as embodied in the prior art) as a cloth). Additionally, Appellant only tests two type of

organic binders (alumina and titania) without testing other known inorganic oxides (such as zirconia or silica) and thus fails to appreciate the range of materials appreciated by the broad claim 1. By only testing a few materials, no position can be made that it is the combination of an inorganic oxide porous layer and a non-woven fabric that provides what Appellant submits is superior and unexpected results, and such results may be consequences of the materials alone (i.e. a porous film with a PP non-woven fabric may have better nail safety penetrations than a porous film with a PE fabric only because the material has a higher melting point, as seen on table 1). Therefore, for the reasons set forth above and within subsections (I) and (II), Examiner submits that Appellant has not shown the fact that the combination of a non-woven cloth and porous film shows unexpected results.

Issue 1(c) – Appellant brings to light that Examiner states that there is no showing of unexpected results since the advantages and disadvantages of non-woven separators and PE layers were known at the time. Specifically, Appellant argues that this statement contradicts the fact that Examiner has previously alleged that PE and non-woven cloth are equivalents, wherein if they were art recognized equivalents, they would exhibit similar characteristics when used in a battery, whereas Appellant has demonstrated via the Examples and Comparative Examples that the materials are significantly different.

Examiner respectfully disagrees with Appellant and submits that Appellant is applying too narrow of a definition to "art recognized equivalents." Even if two materials are art recognized equivalents, the materials themselves are different and thus would

not behave in exactly the same manner. However, such differences do not negate the fact that they both function as a separator. Therefore, the characteristic for being art recognized equivalents is present; in this case, the necessary characteristic is functioning as a separator (i.e. allowing ion transfer between the electrodes). Just because two different separator materials have different advantages and disadvantages does not undermine the fact that they are both recognized as known separator materials, thus making them art recognized equivalents.

Examiner would also like to note emphasize Appellant’s own admitted prior art (Background section) that states that non-woven fabrics retain electrolyte better but have poor mechanical strength, thus resulting in shorter cycle life, while microporous films have low porosity and do not retain electrolyte well, which leads to low capacity (para 004; para 0006). This is what was being relied upon to show the fact that one of ordinary skill in the art would have recognized the advantages and disadvantages to two art recognized separator materials: microporous films and non-woven cloths. In addition to Appellant’s admitted prior art, Examiner would like to again bring to light that Nakamizo et al. further emphasizes that the portion relied upon in Appellant's admitted prior art was known to one of ordinary skill in the art. Nakamizo et al. shows that it was known that microporous films (polyolefin resins as embodied by both the instant application and that of the prior art of Yamashita et al.) is known to have a low-electrolyte retaining characteristic due to only being able to hold electrolyte in the vacant holes (low porosity) and that non-woven fabrics improve the electrolyte retaining nature (para 0006-0008). Therefore Nakamizo et al. shows that low electrolyte retention

(corresponding to a low capacity) was a known problem within microporous films and that high electrolyte retention (corresponding to a high capacity), much like Appellant's own admitted prior art. Additionally, US 6200706 (Ashida et al.) is relied upon as an evidentiary piece to show that it was known to the ordinary artisan that non-woven fabrics are mechanically weak. Example 42 embodies a polyethylene non-woven fabric separator, wherein it is stated that example 42 has low strength and is readily broken (i.e. low mechanical strength), much like Appellant's own admitted prior art (col. 23, lines 62-67; col. 24, lines 1-3; col. 26, lines 58-67). (It is noted that polyethylene is used in example 42, while Appellant's exemplified separators are polypropylene. However polyethylene and polypropylene are similar polyolefins and would thus display similar mechanical characteristics (i.e. low mechanical strength) (para 0003 of the instant application (admitted prior art) and col. 8, lines 13-18 of Ashida et al. both support this position.) Again, Examiner would like to make clear that the evidentiary pieces relied upon herein are merely to emphasize that Appellant's admitted prior art would have indeed been known to one of ordinary skill in the art. Accordingly, Examiner submits although differences exist between microporous film separators and non-woven cloth separators, these differences (manifested as the advantages and disadvantages of each material) were known and thus observations based off of such properties are not novel. Accordingly, such comments about knowing the advantages and disadvantages of the different separator material types (PE microporous film and non-woven fabric) do not contradict the fact that different separator material types are art recognized equivalent (as they are both known separator materials).

With respect to Appellant's mention that Examples and Comparative Examples show that the materials are significantly different, Examiner respectfully disagrees and directs Appellant to section 1(b), wherein Examiner addresses why no unexpected results have been shown.

Issue 1(d) – Appellant argues that Examiner confuses PE (a microporous film) with a porous film comprised of an inorganic oxide filler and a binder, regarding the Advisory action (due to the statement regarding using both a cloth and porous film layer for the advantages of both separator materials) and states that there is no unexpected results, wherein Appellant submits that there is.

Examiner submits that the argument with respect to the Advisory Action was misinterpreted, and thus the response was directed towards a misinterpreted argument. However, Examiner submits that the rejection is still applicable and that no unexpected results have been shown (as appropriately responded to within Issue 1(b)).

Issue 1(e) – Appellant argues that Examiner states that "one of ordinary skill in the art would have expected the capacity to better than that of just the porous film," wherein Appellant has shown that the PE film is combined with a porous film has worse capacity than without a porous film at all, whereas the combination of non-woven film and porous film exhibits superior characteristics.

Again, Examiner submits the argument with respect to the Advisory Action was misinterpreted, and thus the response directed toward it is not applicable. However Examiner would like to note that the point being made was that Appellant's own admitted prior art (Background section) states that non-woven fabrics retain electrolyte

better but have poor mechanical strength, thus resulting in shorter cycle life, while microporous films (not to be confused with the porous film) have low porosity and do not retain electrolyte well, which leads to low capacity (para 004; para 0006). This portion is used to emphasize one of ordinary skill in the art would have known the different advantages and disadvantages to using microporous films and non-woven fabrics as separators and would have known that both materials were known separator materials. In addition to Appellant's admitted prior art, Examiner would like to again bring to light that Nakamizo et al. further emphasizes that the portion relied upon in Appellant's admitted prior art was known to one of ordinary skill in the art. Nakamizo et al. shows that it was known that microporous films (polyolefin resins as embodied by both the instant application and that of the prior art of Yamashita et al.) is known to have a low-electrolyte retaining characteristic due to only being able to hold electrolyte in the vacant holes (low porosity) and that non-woven fabrics improve the electrolyte retaining nature (para 0006-0008). Therefore Nakamizo et al. shows that low electrolyte retention (corresponding to a low capacity) was a known problem within microporous films and that high electrolyte retention (corresponding to a high capacity), much like Appellant's own admitted prior art. Additionally, US 6200706 (Ashida et al.) is relied upon as an evidentiary piece to show that it was known to the ordinary artisan that non-woven fabrics are mechanically weak. Example 42 embodies a polyethylene non-woven fabric separator, wherein it is stated that example 42 has low strength and is readily broken (i.e. low mechanical strength), much like Appellant's own admitted prior art (col. 23, lines 62-67; col. 24, lines 1-3; col. 26, lines 58-67). (It is noted that polyethylene is used

in example 42, while Appellant's exemplified separators are polypropylene. However polyethylene and polypropylene are similar polyolefins and would thus display similar mechanical characteristics (i.e. low mechanical strength) (para 0003 of the instant application (admitted prior art) and col. 8, lines 13-18 of Ashida et al. both support this position.) Again, Examiner would like to make clear that the evidentiary pieces relied upon herein are merely to emphasize that Appellant's admitted prior art would have indeed been known to one of ordinary skill in the art.

Due to the misinterpretation of the arguments with respect to the Advisory Action, Appellant's argument with respect to the argument that PE film in combination with porous film has worse capacity than PE by itself is and with respect to the unexpected results of the combination of the non-woven film and porous film are misguided. However, Examiner notes that the capacity data obtained by the PE film (comparative example 2) and PE film in combination with porous film (comparative example 4) has been address in Issue 1(b), subsection (II). For the reasons listed therein, Examiner submits that the difference in capacity is not unexpected and or significantly different (and that the inclusion does not yield an inferior battery, as the nail penetration safety test is much better for those that have a porous layer). Accordingly, Examiner submits that the rejection of record is still applicable and that no unexpected results have been shown (as appropriately responded to within Issue 1(b)).

Issue 2 – Appellant argues that claims 3 and 4 should be allowable, as it is dependent on allowable claim 1.

Examiner would like to note that Appellant only argues that claims 3 and 4 are dependent on claim 1 but does not argue how the combination is not proper. Therefore, the Examiner maintains the obviousness rejections and upholds the rejection, as above.

Thus the claimed invention is not held to be patentably distinct from the teachings of the prior art references relied upon in the rejections, and the rejections stand.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Eugenia Wang

Junior Examiner - Division 1795

/Eugenia Wang/

Examiner, Art Unit 1795

Conferees:

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